

**A Study on the development of service quality index for
Incheon International Airport**

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<Abstract>

The main purpose of this study is located at developing Ominibus Monitors System(OMS) for internal management, which will enable to establish standards, finding out matters to be improved, and appreciation for its treatment in a systematic way. It is through developing subjective or objective estimation tool with use of importance, perceived level, and complex index at international airport by each principal service items,

The direction of this study came towards for the purpose of developing a metric analysis tool, utilizing the Quantitative Second Data, Analysing Perceived Data through airport user surveys, systemizing the data collection-input-analysis process, making data image according to graph of results, planning Service Encounter and endowing control attribution, and ensuring competitiveness at the minimal international standards .

It is much important to set up a pre-investigation plan on the base of existent foreign literature and actual inspection to international airport. Two tasks have been executed together on the base of this pre-investigation; one is developing subjective estimation standards for departing party, entering party, and airport residence and the other is developing objective standards as complementary methods

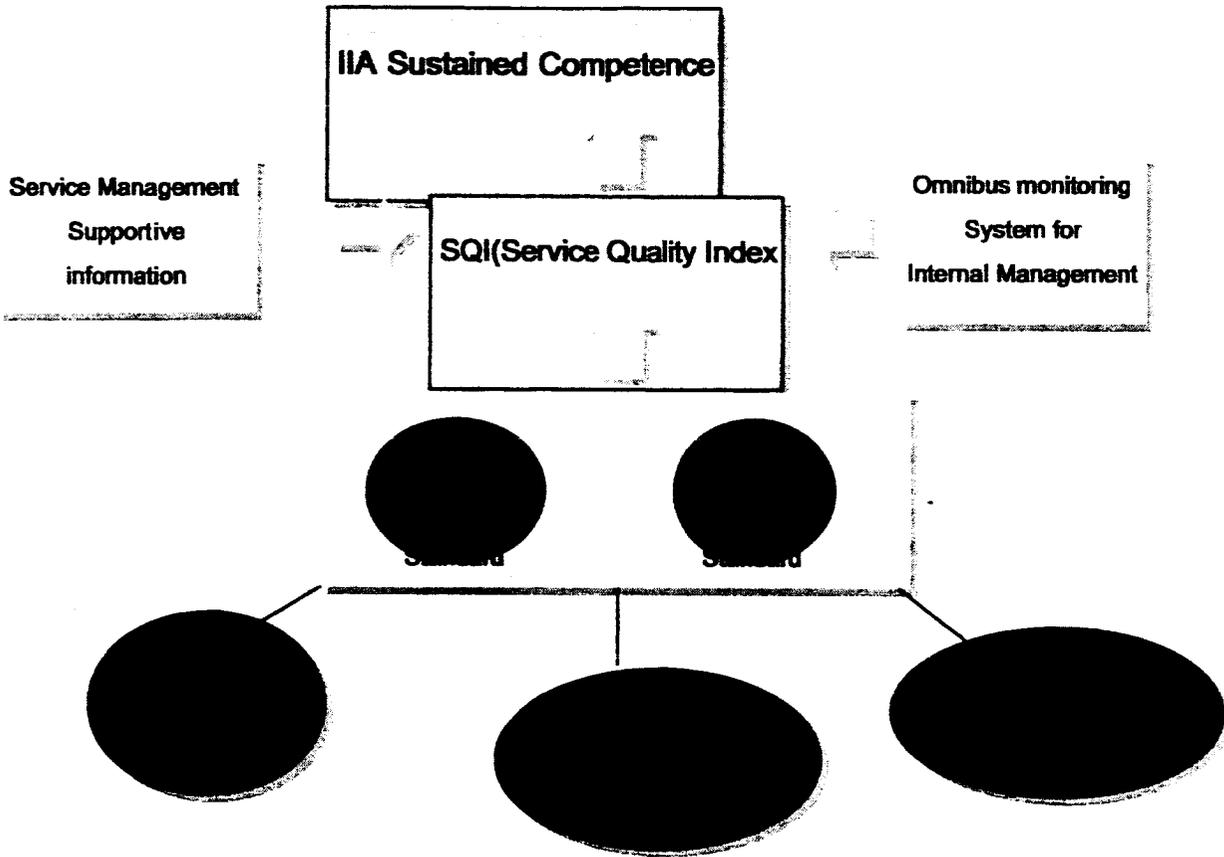
The study has processed for the purpose of monitoring services at airports regularly and irregularly through developing software system for operating standards after ensuring credibility and feasibility of estimation standards with substantial and statistical way.

1. The purpose of study

The main purpose of this study is located at developing Ominibus Monitors System(OMS) for internal management, which will enable to establish standards, finding out matters to be improved, and appreciation for its treatment in a systematic way. It is through developing subjective or objective estimation tool with use of

importance, perceived level, and complex index at international airport by each principal service items

2. Content consist



3. Procedure

In accomplishing this research, it is much important to establish and execute pre-investigation plan on a basis of existing foreign literature and the actual investigation of Incheon International Airport. With this result the pre-investigation, it is possible to develop subjective measurement scale of those embarking, those disembarking and the airport residual employees as well as development of objectivity index as a complementary method.

4. Composition of measurement index

- 1) The number of passenger related field(airport/terminal ground access) : 35
 - (1) The number of common items between ACI and IATA: 23
 - (2) The number of service categories used by which more than 18(25%) of ACI member airports : 5
 - (3) The number of service categories used by which more than 12(20%) of ACI member airports : 2
 - (4) The number of service categories used by which more than 3 of ACI member airports but excepted from the measurement adopted above: 4
 - (5) SATS : 1
- 2) The number of important items in other field : 28
 - (1) The number of items which is excepted from the measurement adopted above but used by more than 5 of ACI member airports
- 3) The number of airlines-related items : 10
 - (1) The number of common item between ACI and SATS : 8
 - (2) SATS : 2

5. Inducement of Weight Production Function

1) The fundamental concept of MCJ

In evaluating the service quality perceived by consumers or customers , most of research adopts frequency analysis or descriptive statistical methods through the qualitative data collected by surveys. But it is not pertinent to use this qualitative data for quantitative analysis. For instance, 5 respondents answer back as 4.00 degree on the question of the level of importance of airport check-in service. It, however, cannot said all of those 5 respondents evaluated with the same level of

importance of check-in services. This comes from each person think each different evaluating categories. These problems require a certain process to transform the qualitative data into quantitative one. From this research which study on the evaluation frame for airport service quality, the Method of Categorical Judgment(MCJ) of a methodology of psychology field was used to transform the qualitative data into quantitative one.

2) Benefit of MCJ (The Method of Categorical Judgment)

- (1) quantifying qualitative data as quantitative one.
- (2) quantifying probability of the characteristics of various airport users
- (3) quantifying qualitative weight according to the characteristics of airport users
- (4) Classifying the service standard of use
- (5) Classifying to general user's characteristics
- (6) Differentiation of importance by each service items
- (7) Ability to composite a matrix of importance and satisfaction for operation management purposes

3) MCJ Methodology

MCJ(The Method of Categorical Judgment: Bock, R.D., and Jones, L.V. *The measurement and Prediction of Judgment and Choice*. San Francisco, Holden-Day, 1968.) is a method to convert qualitative data to quantitative one in evaluating of airport service quality. The purpose of MCJ is lied in presuming a quality (parameters) which shows the characteristics related with the respondents' attitude to the series of stimulus by converting qualitative data to quantitative one

The measurement of response is made up using normal function. The average and dispersion of the stimulus, and it is possible to presume the boundary of categories

related with the qualitative measurement used from the responded data.

6. Implementing survey

1) Survey method

CLT method

2) Composition of survey target

- (1) The number of total respondents : 204
- (2) Departure passengers(95) : Domestic(52), Japanese(15), Chinese(13), Those come from English-spoken culture(15)
- (3) Arriving Passengers(63) : Domestic(33), Japanese(10), Chinese(10), Those come from English-spoken culture(10)
- (4) Airport residual employees(50) : airlines(20), shops(10), government officials(10), ground handlers(10)

3) Survey result satisfaction score(5 full score standards)

- Departure passengers : 3.72
- Arriving passengers : 3.62

4) Reliability

As a result of Cronbach-a test, most of them shows high reliability as above 0.8 (below* the examples of departure passengers are shown in table, and others omitted due to the fall short of paper space)

- (1) Items of satisfaction of departure passengers

[Chart 1] The reliability of departure passengers' satisfaction

Categories of service	Alpha
FIDS	0.8513
Information desk/Telephone information	0.9456
Information guidance post	0.9234
Check-in service	0.9547
Security search	0.9346
Immigration	0.7847
Baggage trolley/porters	0.9362
Food/Restaurants/Bars	0.9467
Duty free shop/shop	0.8929
Departing lounges/waiting areas/Gate lounges	0.9433
Customs	0.9506
Transfer procedures	0.9483
Car	0.6486
Bus	0.9235
Taxi	0.8997
Parking	0.7381
Other services	0.8739

5) Weight by regression analysis

(1) The value of R^2 , t-value is not significant statistically

- The value of R^2 is appeared to be significant only in case of departure,

however, is not significant in case of arriving or airport residual employees

As for the β -value, the number of independent variables which has significant t-value is 6 out of 17 departing variables; otherwise in case of arriving, all of 16 arriving variables are not significant, and in case of airport residual employees, one variable is significant among 27 variables.

(2) Occurrence of multi-collinearity because there are highly correlation between independent variables. The Pearson product moment correlation value independent variables are all significant within 10% consideration levels, therefore it is not desirable that applying regression equation with these independent variables.

7. Comparison of Weight

1) Comparison of arithmetic average between MCJ and raw data

(Ex. Departure passengers)

When it performs relative comparison with converted % of the value of arithmetic average of raw data of importance evaluation, the gravity difference of importance by each item is too low. It can be seen on the difference of the arithmetic average value of raw data in measurement items. But in the comparison between items by MCJ methods adopted in this study, it definitely shows the differences.

[Chart 2] comparison between arithmetic average of raw data and MCJ
(Departure passenger)

Items of Service	MCJ			Arithmetic average		
	?	Converted value(10?)	%	Arithmetic average	Converted value10?)	%
Guidance post	0.969	10.00	9.25	4.677	10.00	6.45
Airport access road	0.386	7.75	7.17	4.560	9.75	6.29
Check-in service	0.366	7.67	7.10	4.559	9.75	6.29
Security Check	0.222	7.12	6.59	4.467	9.55	6.16
Bus	0.216	7.09	6.56	4.467	9.55	6.16
FIDS	0.205	7.05	6.52	4.527	9.68	6.24
Information desk/telephone desk	0.142	6.81	6.30	4.355	9.31	6.01
Connecting with other airline flights	0.141	6.80	6.30	4.352	9.30	6.00
Immigration/Passport	0.115	6.70	6.20	4.247	9.08	5.86
Taxi	-0.089	5.92	5.47	4.143	8.86	5.71
Departing lounge/waiting area/Gate lounge	-0.151	5.67	5.25	4.272	9.13	5.89
Transfer procedures	-0.159	5.64	5.22	4.250	9.09	5.86
Baggage trolleys	-0.165	5.62	5.20	4.194	8.97	5.78
Customs	-0.215	5.43	5.02	4.033	8.62	5.56
Car parking	-0.319	5.03	4.65	3.921	8.38	5.41
Duty-free shop/shop	-0.610	3.91	3.61	3.728	7.97	5.14
Food/Restaurant/Bars	-0.621	3.86	3.57	3.758	8.04	5.18
Total		108.07	100.00	72.509	155.02	100.00

2) Comparison MCJ with β -value (departure passengers)

When producing the level of importance of items using regressive formula, it is predicted to be a problem of multi-collinearity because the correlation between items is forecasted to be much high according to the natural characteristics of this study. And the analysis result show it had no significant by statistically. Nevertheless, in the MCJ analysis, the all items passed goodness of fit. Here follows the comparison of them.

[Chart 3] Comparison MCJ and β -value(departure passenger)

items	MCJ		Regression	
	μ	ranking	β	ranking
Guidance post	0.969	1	0.061	10
Airport Access road	0.386	2	0.571	3
Check-in Service	0.366	3	0.409	4
Security check	0.222	4	-0.124	14
Bus	0.216	5	0.692	1
FIDS	0.205	6	0.188	6
Information desk/telephone information	0.142	7	0.026	11
Immigration/passport	0.115	8	0.092	7
Taxi	-0.089	9	0.543	2
Departing lounges/waiting area/Gate lounges	-0.151	10	-0.341	16
Customs	-0.215	11	-0.018	12
Transfer procedure	-0.159	12	-0.092	13
Baggage trolley	-0.165	13	0.085	8
Car parking	-0.319	14	-0.164	15
Duty-free shops/shops	-0.610	15	0.331	5
food/restaurants/bar	-0.621	16	0.068	9

8. The example of producing the amended value

1) Departing passenger

The scores of each service items can be achieved through multiplying the satisfaction level(5 full score standards) of each service items and the level of importance produced by MCJ value by the converted level of importance(%) to 100% ration of component. The final result was the scores of each service items. Setting 500 as full score standards , the total sum of them was 372.38 as pre-test results and it falls to 74.50% of total. The amended value of arriving passengers and airport residual employees can be achieved through the same way

[Chart 4] Correction Value Output - departure passenger

items	Average level of satisfaction	Level of importance(%)	Corrected value
Guidance post	3.60	9.25	33.34
Airport Access road	3.93	7.17	28.20
Check-in Service	3.89	7.10	27.61
Security check	3.46	6.59	22.80
Bus	4.07	6.56	26.73
FIDS	3.54	6.52	23.11
Information desk/telephone information	3.60	6.30	22.71
Connection with other airline fight	3.75	6.30	23.66
Immigration/passport	3.49	6.20	21.68
Taxi	3.70	5.47	20.28
Departing lounges/waiting area/ Gate lounges	3.90	5.25	20.52
Transfer procedure	4.03	5.22	21.06
Baggage trolley	3.82	5.20	19.90
Customs	3.76	5.02	18.89
Car parking	3.57	4.65	16.62
Duty-free shops/shops	3.66	3.61	13.24
Café/Restaurant/Bar	3.40	3.57	12.14
Total		100.00	<u>372.48</u>

Note) 1. The level of importance(%) is weight reproduced by MCJ

2. The Corrected value is achieved through multiplying the average satisfaction level and MCJ level of importance(%)

3. Same process will be applied to arriving passengers and airport residual employees

9. Conclusion

Seen from above research result, the foregoing research should include that the airport service evaluation index to be developed with distinction the subjective field from objective field fundamentally and each service level target should be established and managed. Particularly, in case of subjective index, the high persuasive result value can be found as a result of investigating the weight level of importance and applying it as more quantified through MCJ methods.

- 1) Classification of subjective area and objective area
- 2) Composition of index by existing literatures and opinions from experts
- 3) Distinction of departure passengers, arriving passengers, airport residual employees, objective index
- 4) Implementing substantiate market survey for development index
 - (1) Composition of plural items and measurement of level of importance
 - (2) Ensuring statistical reliability and reasonableness
- 5) Establishing target value by each index
- 6) Amending target value with consultation with concerned airport authority's department

<Appendix>

[Chart 5] composition of subjective and objective items to be measured

Service area	Detail items	
	subjective	Objective
FIDS/light board	<ul style="list-style-type: none"> · pertinent location of deployed · quick information 	
Information desk	<ul style="list-style-type: none"> · familiarity with staff · expert of staff working · pertinent response to question 	<ul style="list-style-type: none"> · waiting time telephone response
Guiding post	<ul style="list-style-type: none"> · optical perception · pertinent number of posts · expression 	
Check-in service	<ul style="list-style-type: none"> · familiarity with staff · efficiency of staff working 	<ul style="list-style-type: none"> · waiting time for check-in
Security check	<ul style="list-style-type: none"> · familiarity with staff · efficiency of staff working · feeling to security 	<ul style="list-style-type: none"> · waiting and passing through time
immigration/ passport	<ul style="list-style-type: none"> · manner of staff working · waiting time for procedure 	<ul style="list-style-type: none"> time taken waiting and passing through inspection · time taken for immigration procedures
Baggage delivery	<ul style="list-style-type: none"> · easiness for use of baggage trolley · service speed of baggage treating 	<ul style="list-style-type: none"> · the time period between first baggage and last · waiting time for passenger baggage · exact classification of baggage
Baggage trolley/porter	<ul style="list-style-type: none"> · availability of carter · convenience of moving carter · pertinent fare for using porter 	
food/restaurant/bar	<ul style="list-style-type: none"> · the quality level of food · cleanliness · level of price vs service · variety of kind of selection · courtesy of restaurant employee · waiting time/staff service efficiency/delivery time 	

Duty-free shop/shop	<ul style="list-style-type: none"> · variety of selection type · price when considering the quality of product · courtesy of clerk · waiting time/staff service efficiency/ speed of service 	
Departing lounges/waiting area/gate lounges	<ul style="list-style-type: none"> · seat comfortability/cleanliness · seat availability 	
Customs	<ul style="list-style-type: none"> · attitude and courtesy of custom officer · speedy progress of inspection 	<ul style="list-style-type: none"> · waiting time
Other services	<ul style="list-style-type: none"> · delay measurement of flight · customer opinion proposal system · availability of public telephone/ · restroom · cleanness of terminal 	<ul style="list-style-type: none"> · customer complainment handling · aircraft average rate of punctuality
Transfer	<ul style="list-style-type: none"> · connect convenience other flight · service efficiency of transfer counter · staff manner of transfer counter 	<ul style="list-style-type: none"> · transfer time
Bus	<ul style="list-style-type: none"> · friendliness and attitude of bus driver · interval time 	<ul style="list-style-type: none"> · punctuality of longhaul limousine
Taxi	<ul style="list-style-type: none"> friendliness and attitude of taxi driver · pick up a taxi 	<ul style="list-style-type: none"> · taxi waiting time
Car	<ul style="list-style-type: none"> · road signpost/traffic signpost · disturbance expense level(including to fuel price, tollpay) 	
Parking area	<ul style="list-style-type: none"> · ease of finding site · proximity to terminal building · fares 	<ul style="list-style-type: none"> · The internal organs parking lot – terminal for shuttle bus waiting time · waiting time exit of parkinglot

	<ul style="list-style-type: none"> · availability of parkinglot · attitude of personnel working at parking 	
Airport residual employees(subjective inquiry)		
Commonness	<ul style="list-style-type: none"> · attitude of airport corporation staff · construction staff attitude. the control against the chief mourner worker opinion proposal · airport expense efficiency · whole cleanness of terminal 	
Cargo	<ul style="list-style-type: none"> · whole cargo service · cargo equipment, warehouse/cargo facilities and land availability 	
Facilities	<ul style="list-style-type: none"> · the number of runway, apron, taxiway · apron and gate availability · airport's technical equipment availability · ground handling facilities availability 	
Security service	<p>[terminal security]</p> <ul style="list-style-type: none"> · passenger baggage security check · passenger soul cap hour control · the travel document and the passport and contrast confirmation of onboard volume <p>[airside security]</p> <ul style="list-style-type: none"> · the aviation side for luggage it searches · luggage protection and escort · luggage ID · aircraft security checking <p>[the freight and mail checking].</p> <ul style="list-style-type: none"> · the freight and the express dispatch freight it searches · security control of the treasure and the diplomatic mailbag · protection and escort of freight mail <p>[generality]</p> <ul style="list-style-type: none"> · urgent request confrontation attitude · Courtesy and the attitude which helps. · human being the etiquette 	
Terminal service	<ul style="list-style-type: none"> · Departure gate control · boarding and the others guidance broadcasting cleanness 	

	<ul style="list-style-type: none"> · control of the passenger where the help due to an advance request is necessary · passenger support from the luggage arrival area · lost article center service · the luggage tracking coordination which is controlled · human being the etiquette · courtesy and help the attitude which it gives
Emigration passenger - Airport residual employee (common)	
<ul style="list-style-type: none"> · airport fine view satisfaction. · airport use general satisfaction 	

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